



Dart Aerospace Ltd.
1270 Aberdeen St
Hawkesbury, ON
K6A 1K7
Canada

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4

D412-664-203TRN
Job Sheet 195158



Part No: D412-664-203TRN

Job Qty: 1 pcs

Part Name: Crosstube Turning Detail



Part Weight: 0 lbs

Status: New

Priority: Medium

Job Created: 5/15/19

Job Tracking No:

Due Date: 5/29/19

Created By: Marie Lajeunesse

Type: Stock

Description:

Note: D412-664-243 REV F IPP Rev:A 08-03-06 new issue DD verified by:eec IPP Rev B 08.04.02 Removed polish
EC verified by: DD

Ship Via:

Bill of Materials

Job Routing

Op No	Operation	Qty	Start Date	Due Date	Standard		Workcenter/Supplier		DAS	Sign-off
					Setup Hrs	Run Hrs	Workcenter / Supplier	Lead Time		
100	Mori Seiki TL-40 - 1	1 pcs	5/29/19	5/29/19	3.21	1.33	Mori Seiki TL-40 - 1		66	2019-06-03
110	QC 2	1 pcs	5/29/19	5/29/19	0.00	0.00	QC 2 - 1		9-89	
							QC 2 - 12			
							QC 2 - 14			
							QC 2 - 17			
							QC 2 - 19			
							QC 2 - 2			
							QC 2 - 20			
							QC 2 - 22			
							QC 2 - 23			
							QC 2 - 25			
							QC 2 - 32			
							QC 2 - 33			
							QC 2 - 35			
							QC 2 - 39			
							QC 2 - 4			
							QC 2 - 40			
							QC 2 - 44			
							QC 2 - 45			
							QC 2 - 48			
							QC 2 - 49			
							QC 2 - 50			
							QC 2 - 51			
							QC 2 - 52			
							QC 2 - 57			
							QC 2 - 62			
							QC 2 - 63			
							QC 2 - 8		66	2019-06-03
							QC 2 - 66		9-89	
							QC 2 - 64			

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					QC 2 - 65	
					QC 2 - 5	
					QC 2 - 71	DAS
120	Mori Seiki TL-40 - 2 - B4B	1 pcs	5/29/19	0.00 1.67	Mori Seiki TL-40 - 1 - B4B	66 2019-06-04 9-89
130	QC 2	1 pcs	5/29/19	0.00 0.00	QC 2 - 1	
					QC 2 - 12	
					QC 2 - 14	
					QC 2 - 17	
					QC 2 - 19	
					QC 2 - 2	
					QC 2 - 20	
					QC 2 - 22	
					QC 2 - 23	
					QC 2 - 25	
					QC 2 - 32	
					QC 2 - 33	
					QC 2 - 35	
					QC 2 - 39	
					QC 2 - 4	
					QC 2 - 40	
					QC 2 - 44	
					QC 2 - 45	
					QC 2 - 48	
					QC 2 - 49	
					QC 2 - 50	
					QC 2 - 51	
					QC 2 - 52	
					QC 2 - 57	
					QC 2 - 62	
					QC 2 - 63	
					QC 2 - 8	DAS
					QC 2 - 66	66 2019-06-04 9-89
					QC 2 - 64	
					QC 2 - 65	
					QC 2 - 5	
					QC 2 - 71	
140	QC 8	1 pcs	5/29/19	0.00 0.00	QC 8 - 12	
					QC 8 - 14	
					QC 8 - 17	
					QC 8 - 20	
					QC 8 - 25	
					QC 8 - 3	
					QC 8 - 32	
					QC 8 - 33	
					QC 8 - 35	
					QC 8 - 39	
					QC 8 - 4	
					QC 8 - 44	
					QC 8 - 45	
					QC 8 - 49	
					QC 8 - 58	
					QC 8 - 8	
					QC 8 - 9	
					QC 8 - 68	DAS
					QC 8 - 67	67 11-06-12 9-89
					QC 8 - 1 (A)	
					QC 8 - 47	
					QC 8 - 40	
					QC 8 - 52	

				QC 8 - 23	
145 Crosstubes - 2 - B4B	1 pcs	5/29/19	0.00 0.25	Crosstubes - 1 - B4B	
				Crosstubes - 2 - B4B	SB 6/19/19
				Crosstubes - 3 - B4B	
				Crosstubes - 4 - B4B	
150 Crosstubes - 3 - B4B	1 pcs	5/29/19	0.00 0.92	Crosstubes - 1 - B4B	
				Crosstubes - 2 - B4B	SM 06/19/19
				Crosstubes - 3 - B4B	
				Crosstubes - 4 - B4B	
160 QC 7	1 pcs	5/29/19	0.00 0.00	QC 7 - 10	
				QC 7 - 13	
				QC 7 - 14	
				QC 7 - 15	
				QC 7 - 17	
				QC 7 - 18	
				QC 7 - 19	
				QC 7 - 2	
				QC 7 - 28	
				QC 7 - 3	
				QC 7 - 30	
				QC 7 - 34	
				QC 7 - 36	
				QC 7 - 37	
				QC 7 - 41	
				QC 7 - 47	
				QC 7 - 48	
				QC 7 - 51	
				QC 7 - 58	
				QC 7 - 59	
				QC 7 - 60	
				QC 7 - 9	
				QC 7 - 68	
				QC 7 - 50	
				QC 7 - 67	GP 19-06-20
				QC 7 - 40	
				QC 7 - 24	
				QC 7 - 43	
170 Packaging 3-1 - Stock - B4B	1 pcs	5/29/19	0.00 0.00	Packaging 3 - 1 - B4B	
				Packaging 3 - 2 - B4B	
				Packaging 3 - 3 - B4B	
				Packaging 3 - 4 - B4B	
				Packaging 3 - 5 - B4B	
				Packaging 3 - 6 - B4B	
				Packaging 3 - 7 - B4B	
				Packaging 3 - 8 - B4B	
				Packaging 3 - 9 - B4B	
				Packaging 3 - 10 - B4B	
				Packaging 3 - 11 - B4B	
				Packaging 3 - 12 - B4B	
				Packaging 3 - 13 - B4B	
				Packaging 3 - 14 - B4B	
				Packaging 3 - 15 - B4B	
				Packaging 3 - 16 - B4B	
				Packaging 3 - 17 - B4B	
				Packaging 3 - 18 - B4B	
				Packaging 3 - 19 - B4B	
				Packaging 3 - 20 - B4B	
				Packaging 3 - 21 - B4B	
				Packaging 3 - 22 - B4B	
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				Packaging 3 - 23 - B4B	
				Packaging 3 - 24 - B4B	
				Packaging 3 - 25 - B4B	
				Packaging 3 - 26 - B4B	
				Packaging 3 - 27 - B4B	
				Packaging 3 - 28 - B4B	
				Packaging 3 - 29 - B4B	
				Packaging 3 - 30 - B4B	
				Packaging 3 - 31 - B4B	
				Packaging 3 - 32 - B4B	
				Packaging 3 - 33 - B4B	
				Packaging 3 - 34 - B4B	DAS
				Packaging 3 - 35 - B4B	21 JUN 20 2019
				Packaging 3 - 36 - B4B	9-89
180 QC 21 - SA	1 pcs	5/29/19	0.00 0.00	QC 21 - SA - 21	
				QC 21 - SA - 70	DAS JUN 20 2019
				QC 21 - SA - 53	21

Part Op 100 - 1-Fill tube with sand & install plugs 412-203 on both ends as per Folio FA166 2-Face both sides of tube 3-Turn first Descriptions: taper section on both side as per Folio FA166 4- blend transition lines using belt sander with 60 grit sandpaper

110 - (QC2- Inspect parts off machine FAI/FAIB)

120 - Mori Seiki TL-40 (Mori Seiki CNC Lathe Large) 1-Turn second taper on both sides as per Folio FA166 2- Blend transition lines using belt sander with 60 grit sandpaper. 3- Remove sand and plugs 4-Scribe part # and batch # using vibrating stilus

130 - (QC2- Inspect parts off machine FAI/FAIB)

140 - (QC8- Inspect parts - second check)

145 - GRIND ONLY TRANSITION LINES SMOOTH LONGITUDE WAY.

150 - 1- handfinish X-TUBE INSIDE AND OUT

160 - (QC7-Inspect Chemical Conversion Coat)

170 - (Identify as per dwg & Stock Location: _____) LOCATION : LG014

180 - (QC21- Final Inspection - Work Order Release)

Job BOM				
Part / Item	Component Name	Quantity	Operation	Container
D6009-129	Crosstube Material	1 pcs (1 ea)	100-Mori Seiki TL-40 - 1	E123972

Job Allocations				
Operation	Component Part	Required	Inventory	Allocated
100-Mori Seiki TL-40 - 1	D6009-129	1	84	0

Part Specifications	
Specifications could not be found.	



Container No: S186621



Part: D412-664-203TRN

Job No: 195158

Serial No/Batch: S186621

Revision: F

Inspector:

Exp Date:

Instructions:

Dart Aerospace Ltd.
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CANADA
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Email: sales@dartaero.com
www.dartaerospace.com

Date: 06/03/19

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DART AEROSPACE LTD	Work Order:	195158
Description: Crosstube Assembly (412 High Aft)	Part Number:	D412-664-243
Inspection Dwg: D412-664-243 Rev: F		Page 1 of 2

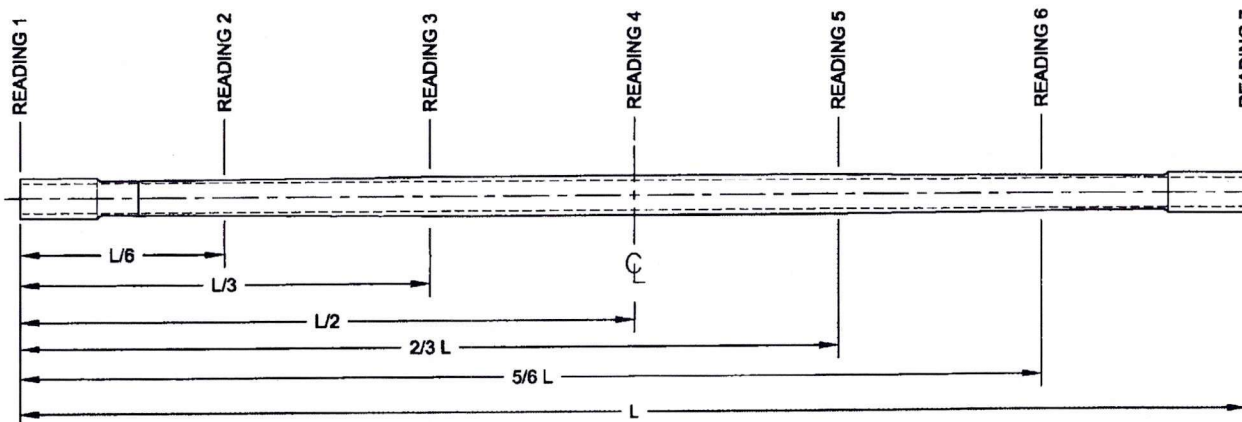
FIRST ARTICLE INSPECTION CHECKLIST

Inspection Sheet	Drawing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
SIDE A	2.684	+0.005/-0.000	2.687	✓		CNC-04	
	2.748	+0.005/-0.000	2.753	✓		↓	
	2.884	+0.005/-0.000	2.888	✓		↓	
	3.019	+0.005/-0.000	3.024	✓		CNC-05	
	3.163	+0.005/-0.000	3.168	✓		↓	
	3.308	+0.005/-0.000	3.313	✓		↓	
	3.429	+0.005/-0.000	3.434	✓		↓	
	2.990	+0.005/-0.000	2.995	✓		CNC-04	
	2.618	+0.005/-0.000	2.622	✓		"	
	0.200	+/-0.010	.192	✓		CNC-08	
	R0.063	+/-0.010	.063	✓		RG	
	R0.500	+/-0.010	.500	✓		"	
	4.971	+/-0.030	4.973	✓		CNC-08	
SIDE B	2.684	+0.005/-0.000	2.689	✓		CNC-04	
	2.748	+0.005/-0.000	2.753	✓		↓	
	2.884	+0.005/-0.000	2.889	✓		↓	
	3.019	+0.005/-0.000	3.024	✓		CNC-05	
	3.163	+0.005/-0.000	3.168	✓		↓	
	3.308	+0.005/-0.000	3.313	✓		↓	
	3.429	+0.005/-0.000	3.434	✓		↓	
	2.990	+0.005/-0.000	2.995	✓		CNC-04	
	2.618	+0.005/-0.000	2.623	✓		"	
	0.200	+/-0.010	.195	✓		CNC-08	
	R0.063	+/-0.010	.063	✓		RG	
	R0.500	+/-0.010	.500	✓		"	
	4.971	+/-0.030	4.978	✓		CNC-08	
	124.100	+/-0.020	124.100	✓		Tape	

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DART AEROSPACE LTD	Work Order: 195158
Description: Crosstube Assembly (412 High Aft)	Part Number: D412-664-243
Inspection Dwg: D412-664-243 Rev: F	Page 2 of 2

WALL THICKNESS MEASUREMENT



Location	WALL THICKNESS MEASUREMENT (IN)				Deviation Δw (max-min)	TOLERANCE
	w1	w2	w3	w4		
READING 1 L = 0"	.378	.363	.360	.377	.018	0.073"
READING 2 L = 20.623	.280	.296	.334	.324	.054	
READING 3 L = 41.367	.456	.474	.511	.498	.055	
READING 4 L = 62.050	.641	.619	.622	.635	.022	
READING 5 L = 82.733	.478	.476	.482	.495	.019	
READING 6 L = 103.417	.311	.303	.301	.309	.010	
READING 7 L = 124.100	.373	.365	.367	.373	.008	

Calibration Result

Actual Block Thickness: 100-750
Sitescan 250 Measured Thickness: 100-750

Measured by: DAS 66 9-89	Audited by: DAS 67 9-89	Preliminary Approval:
Date: 2019-06-04	Date: 19-06-12	Date:

Rev	Date	Change	Revised by	Approved
A	04.06.16	New Issue (P/O D412-664-203)	KJ/JLM	
B	06.03.09	Dwg Rev updated	KJ/JLM	
C	07.05.08	Tolerance updated for dimension 4.971	KJ/JLM	
D	10.02.02	Dimension 124.100 was 124.09	KJ	
E	12.06.04	Wall thickness form added	KJ	
F	14.06.24	Dwg Rev updated	KJ	

Item	Qty -243	Part Number	Description
1	X	D412-664-243	CROSSTUBE ASSEMBLY (412 HIGH AFT)
2	1	D6009-129	CROSSTUBE
3	2	D3595-063-570	RUBBER CUSHION
4	1	D2896-1	SUPPORT
5	2	D3189-1	CHAFING SHIELD
7	4	MS21920-28	CLAMP
8	2	MS21920-30	CLAMP (OR MS21920-32)
9	A/R	SCOTCH-WELD DP460	EPOXY ADHESIVE, 3M SCOTCH-WELD
10	A/R	PROSEAL 890 B-2	SEALANT

GENERAL NOTES:

- 1) MATERIAL: MANUFACTURED FROM D6009-129
FINISHED LENGTH = 124.100±0.020 (BEFORE BENDING)
- 2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
MASK UNDERSIDE OF CROSSTUBE AS SHOWN (ZN C6-2, HATCHED AREA)
PAINT OUTSIDE PER DART QSI 005 4.2
AFTER PAINTING, REMOVE MASKING AND APPLY MATTE CLEAR COAT
- 3) TOLERANCES: PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 4) UNITS: INCHES UNLESS OTHERWISE NOTED.
- 5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- 6) IDENTIFICATION: DART P/N 'D412-664-243' AND B/N ON INSIDE OF CUFF PER QSI 044 6.4 (VIBRATING STYLUS)
- 7) WEIGHT: 47.0 lbs
- 8) PART IS SYMMETRIC ABOUT CENTERLINE.
- 9) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE. DO NOT GRIND TUBE AFTER SHOT PEEN.

TURNING

- 10) WHEN TRANSITIONING TO STOCK MAT'L, RUN CUTTER OFF PART. BLEND OUT EDGE LONGITUDINALLY. TRANSITION SHOULD BE SMOOTH.

BENDING

- 11) BEND PROGRESSIVELY WITH A MINIMUM OF 8 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 7% (BASED ON O.D.) IN LOWER HALF OF R30 BEND AND 8% (BASED ON O.D.) ON REMAINING TUBE.
- 12) LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038. TO BE PERFORMED AFTER FINAL POST-BEND GRINDING. ANY ADDITIONAL GRINDING REQUIRES ANOTHER LPI INSPECTION.

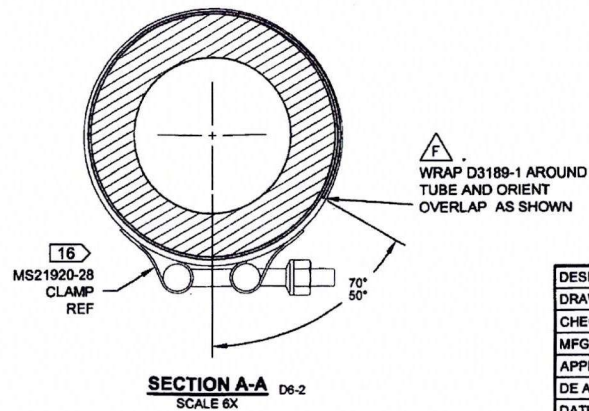
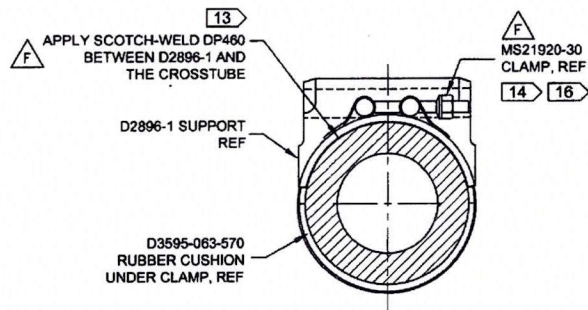
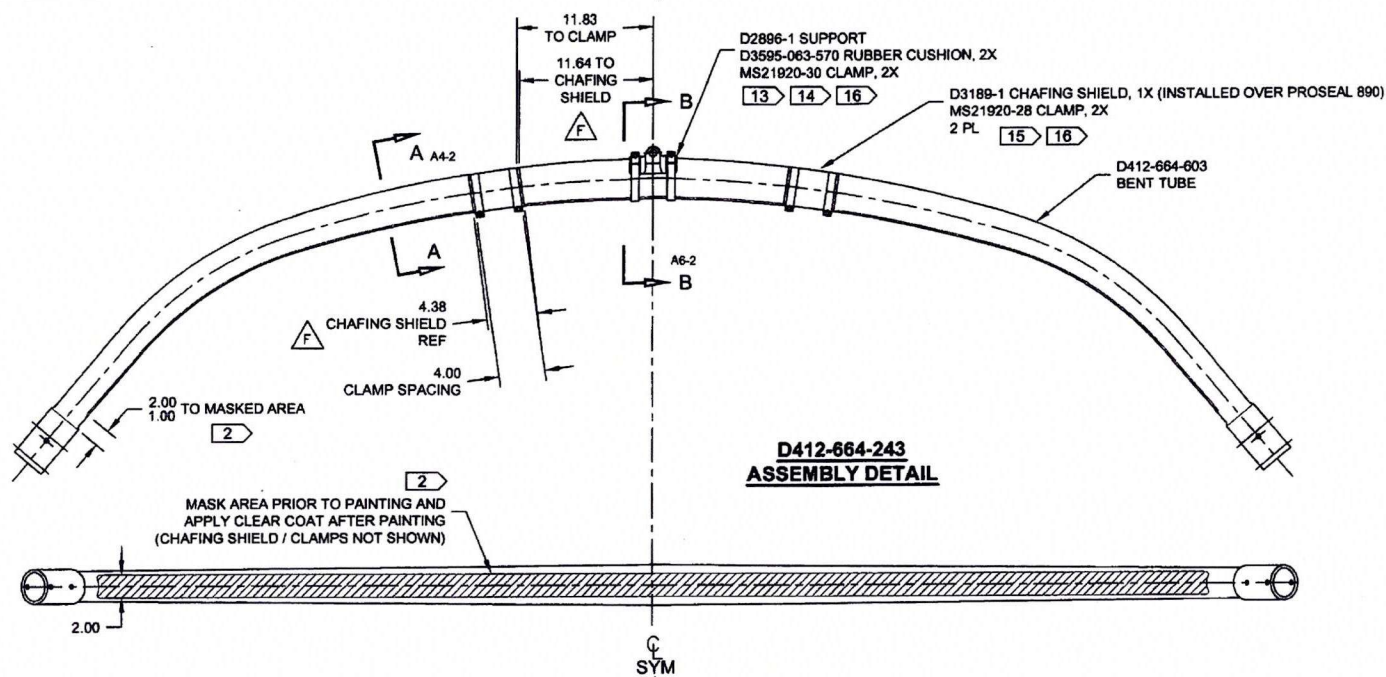
ASSEMBLY

- 13) INSTALL D2896-1 CENTER SUPPORT USING A 0.04" TO 0.07" THICK LAYER OF SCOTCH-WELD DP460 PER QSI 015.
- 14) INSTALL MS21920-30 CLAMPS (OR -32) WITH D3595-063-570 RUBBER CUSHIONS TO SECURE THE D2896-1 SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMPS ARE ON TOP SIDE OF CROSSTUBE.
- 15) APPLY A THIN COAT OF PROSEAL 890 ON INSIDE CONCAVE SURFACE OF D3189-1 CHAFING SHIELD AND LET CURE PER MANUFACTURER'S INSTRUCTIONS. INSTALL PROSEAL D3189-1 CHAFING SHIELD ONTO CROSSTUBE BY APPLYING A THIN COAT OF PROSEAL 890 ONTO CROSSTUBE. BE SURE TO ELIMINATE ANY AIR GAPS.
- 16) TORQUE CLAMPS ON D2896-1 SUPPORT 80 TO 100 IN-LB. TORQUE CLAMPS ON D3189-1 CHAFING SHIELD 40 TO 50 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING. PRIOR TO PACKAGING, RE-CHECK TORQUE ON CLAMPS AFTER ADHESIVES HAVE CURED FOR 24 HOURS.

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SUBJECT TO AMENDMENT
WITHOUT NOTICE
WORK ORDER
NO. 195158 MWS
19-06-05

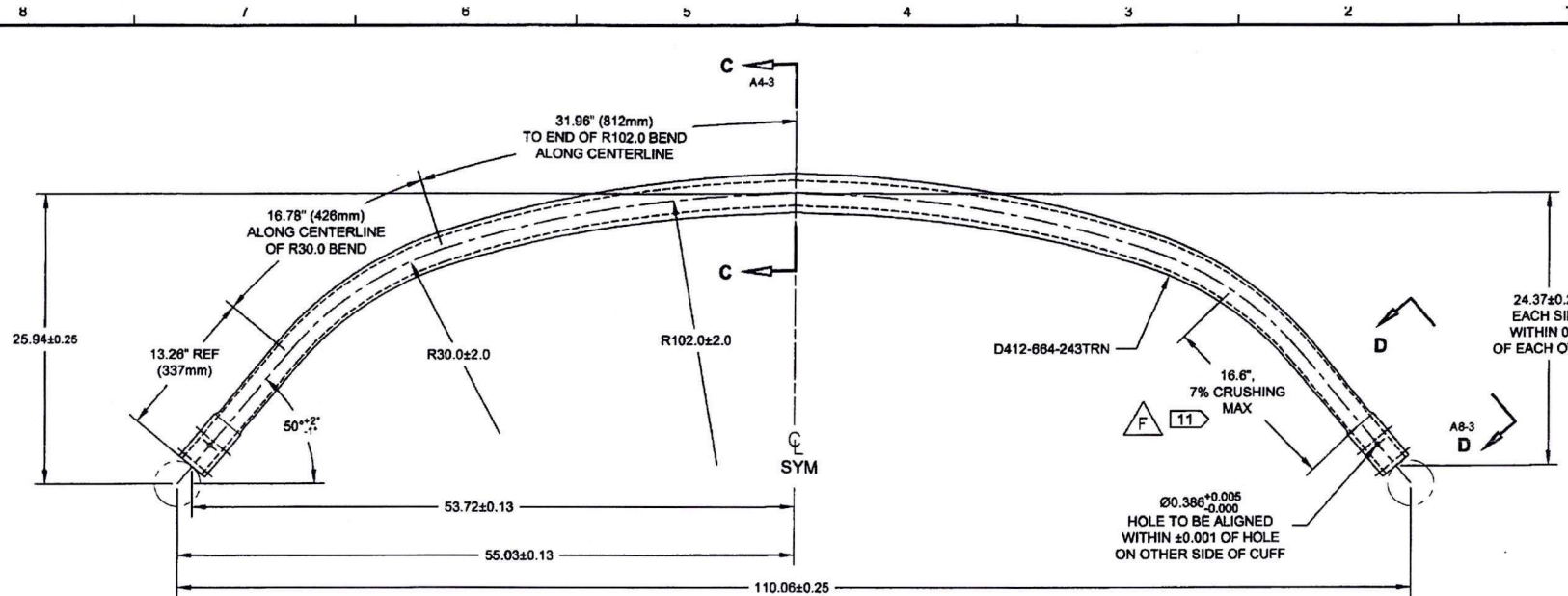
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2014-05-26
WMD

F	NOTES RE-ORDERED, SCOTCH-WELD WAS MAGNOBOND (C8-1), ADD CLAMP RETORQUE (A8-1), REMOVE ABRASION STRIP, ADD INSPECTION WINDOW (C8-1), CHAFING SHIELD NOW 4.38 WIDE (C8-2), ADD 7% CRUSHING (B8-1), CHG BEND HEIGHT TOL TO ±0.25 (C1-3), CHG CUFF TOL (D2-4), CLAMPS FLIPPED TO PREVENT CHAFING (B7-2, B7-3), INCORP. DEO E-2/4	CP	14.04.01
E	REFORMAT/REVISE GENERAL NOTES; REORGANIZED VIEWS AND REFORMATTED DRAWING TO CURRENT STANDARDS; RELOCATED FLAG #8 PER PAR 08-046 (ZN A6-3); ADD TOLERANCE (ZN B6-3, C4-3, C8-3 & C5-3); MOVED TURNING DETAIL & UPDATED TOLERANCE TO SHEET 4.	RF	09.09.30
D	REMOVE D2732-058, CHANGE TO D3595-063-570	PH	07.03.09
C	REMOVE D2856-600-1087, ADD D2732-058 & MAGNOBOND 6398, MS21920-32 WAS MS21920-30	MB	06.10.27
B	ADD HOLES FOR COMPATABILITY WITH BHT/AA SKIDTUBES	PH	05.02.04
A	NEW ISSUE	PH	01.10.17
REV.	DESCRIPTION	BY	DATE
DESIGN	Q	DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
DRAWN	Q		
CHECKED	DW	DRAWING NO.	REV. F
MFG. APPR.	EA	D412-664-243	SHEET 1 OF 4
APPROVED	SH	TITLE	SCALE
DE APPR.	SH	CROSSTUBE ASSEMBLY (412 HI AFT)	NTS
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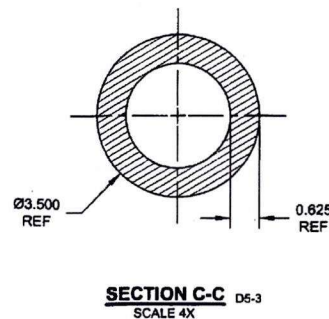
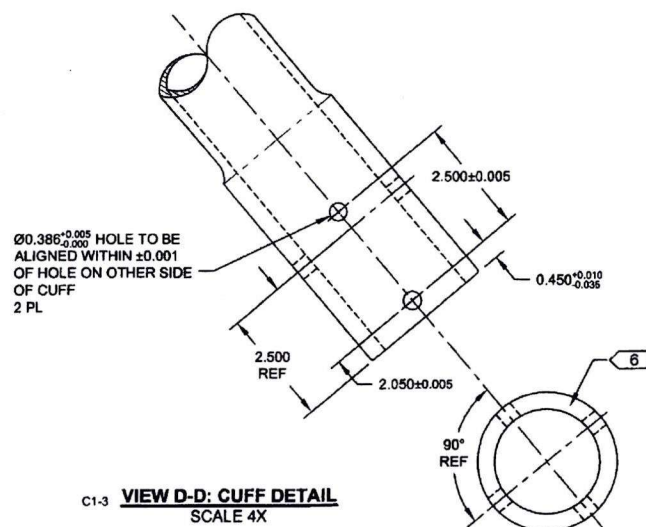


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DRAWN		HAWKESBURY, ONTARIO, CANADA
CHECKED		DRAWING NO. REV. F
MFG. APPR.		D412-664-243 SHEET 2 OF 4
APPROVED		TITLE SCALE
DE APPR.		CROSSTUBE ASSEMBLY (412 HI AFT) NTS
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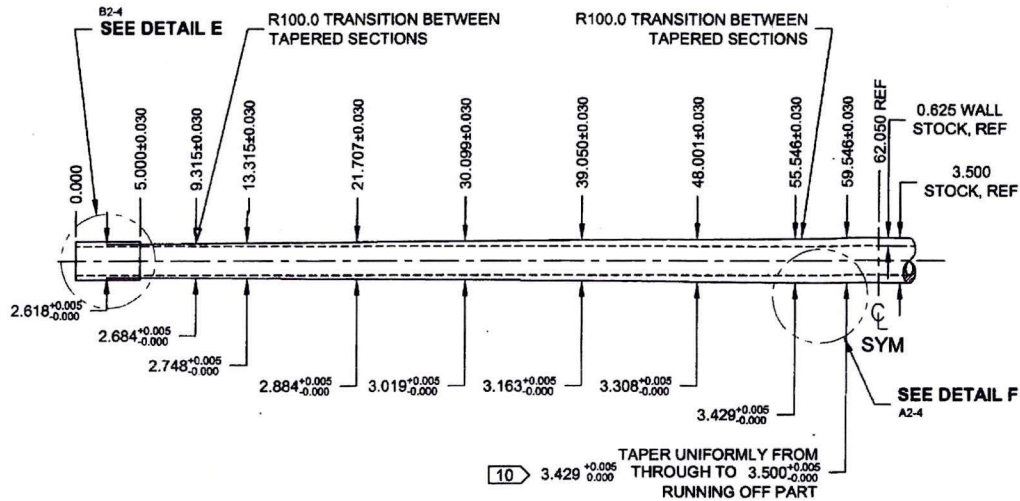


D412-664-603
BENDING AND DRILLING DETAIL

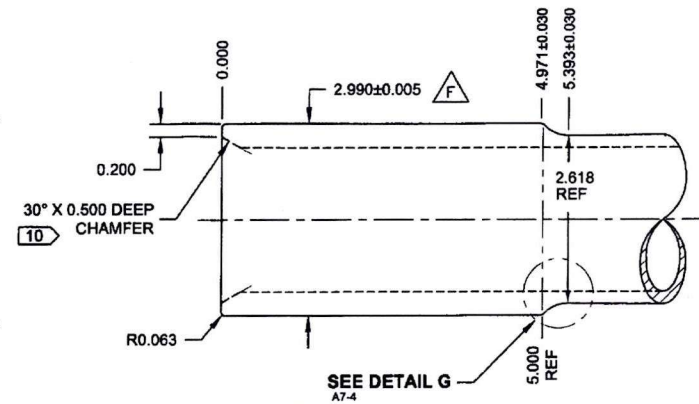


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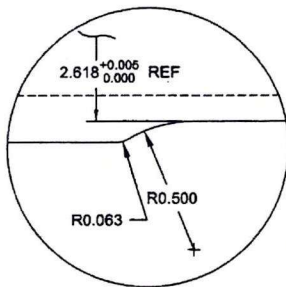
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CHECKED		DRAWING NO.	REV. F
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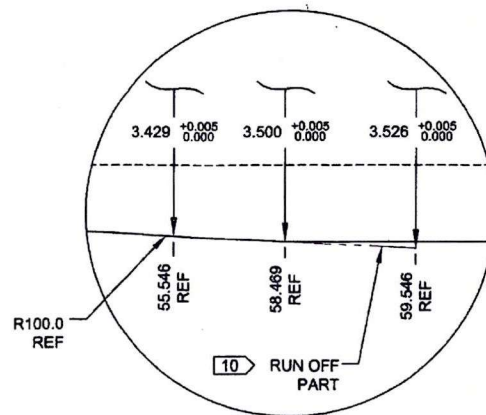
D412-664-243TRN
TURNING DETAIL



DETAIL E:
CROSSTUBE CUFF
SCALE 5X D8-4



DETAIL G:
CUFF TRANSITION
SCALE 10X C2-4



DETAIL F:
TAPER RUN-OFF
NOT TO SCALE C4-4

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2014-05-26

DESIGN	<i>Q</i>	DART AEROSPACE LTD	
DRAWN	<i>Q</i>	HAWKESBURY, ONTARIO, CANADA	
CHECKED	<i>Q</i>	DRAWING NO.	REV. F
MFG. APPR.	<i>Q</i>	D412-664-243	SHEET 4 OF 4
APPROVED	<i>Q</i>	TITLE	SCALE
DE APPR.	<i>Q</i>	CROSSTUBE ASSEMBLY (412 HI AFT)	NTS
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Entered: _____ Date: _____



WORK ORDER NON-CONFORMANCE / ROUTE UPDATE

NCR No. _____

Route update only ☐

Job: _____ Part No. _____	DISPOSITION Rework ☐ Scrap ☐ Use-as-is ☐	DEPARTMENT/PROCESS Skid-tube ☐ Machining ☐ Large Fab ☐ Cross tube ☐ Small Fab ☐ Finishing ☐ Eng. (Non-AW) ☐ Prod. Eng. Coord. ☐ Rec/Store/Packaging ☐ Engineering ☐ Water Jet ☐ Supplier ☐ Quality ☐			
Date : _____	Sequence #: _____	QTY Affected : _____		MRB (QSI042)	
Description Work Order Deviation		Disposition		Completed By	
				Lead hand / Supervisor	
				QC / QA Coordinator	
Root Cause Operator ☐ Manufacturing Process ☐ Equip/Tooling ☐ Handling/Preservation ☐ Material ☐ Product Improvement ☐ Process Improvement ☐ Human Factors ☐		FAULT CATEGORY ☐ Pressure/Forced ☐ Bending ☐ Crushing ☐ Cracks ☐ Crimp/Kink/Ripple/Wave/Twist ☐ Marks/Chatter ☐ Mislabeled ☐ Contamination ☐ Misaligned/off center ☐ BOM/Route ☐ Broken/Damage/Defect ☐ Incomplete/Unclear Instructions ☐ Drill Holes ☐ Fit/Function ☐ Power Loss/Surge ☐ Folio/Program ☐ Grain Direction ☐ Weld ☐ Wrong Stock Pulled ☐ Out of Sequence ☐ Off-set/Set-up ☐ Positioned Wrong ☐ Outside Tolerance ☐ Drawing ☐ Finish ☐ Part Lost/Missing ☐ Misread			
Other/Details:					